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EXAMINER

BOLOURCHI, NADER

ART UNIT	PAPER NUMBER
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2611

MAIL DATE	DELIVERY MODE
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07/08/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/537,598	Applicant(s) LINNARTZ, JOHAN PAUL	
	Examiner NADER BOLOURCHI	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 May 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-8 and 10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remarks

1. Applicant's amendment dated 5/18/2009 is entered.
2. Applicant canceling claims 9 is acknowledged.
3. Claim Rejections under 35 USC § 112, in view of the amendment is withdrawn.

Response to Arguments

4. Examiner notes that the Applicant confines his arguments to the patentability of independent claim 1, and does not provide additional arguments addressing the patentability of dependent claims 2-8 and 10. (Remarks, pages 5-7) Accordingly, dependent claims 2-8 and 10 are grouped together and stand or fall with independent claim 1. Applicant waives separate argument of the patentability of the grouped claims.
5. Applicant's arguments filed have been fully considered but they are not persuasive.
6. In regards to claim 1, the Applicant properly notes and admits, as depicted in extract from page 6 of his remarks below (emphasis added):

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Applicant submits that the Examiner is mistaken. Applicant notes that Bottomley clearly shows separate channel estimators 302 for each of the branches $r_a(n)$ and $r_b(n)$. While Bottomley shows the outputs from these two channel estimators being co-processed in an impairment correlation processor 306 and a weight processor 204 for providing weights for respective half complex multipliers (HCM) 208, the two channel estimators operate independently from each

7. Applicant also notes and admits, as depicted in extract from page 6 of his remarks below (emphasis added):

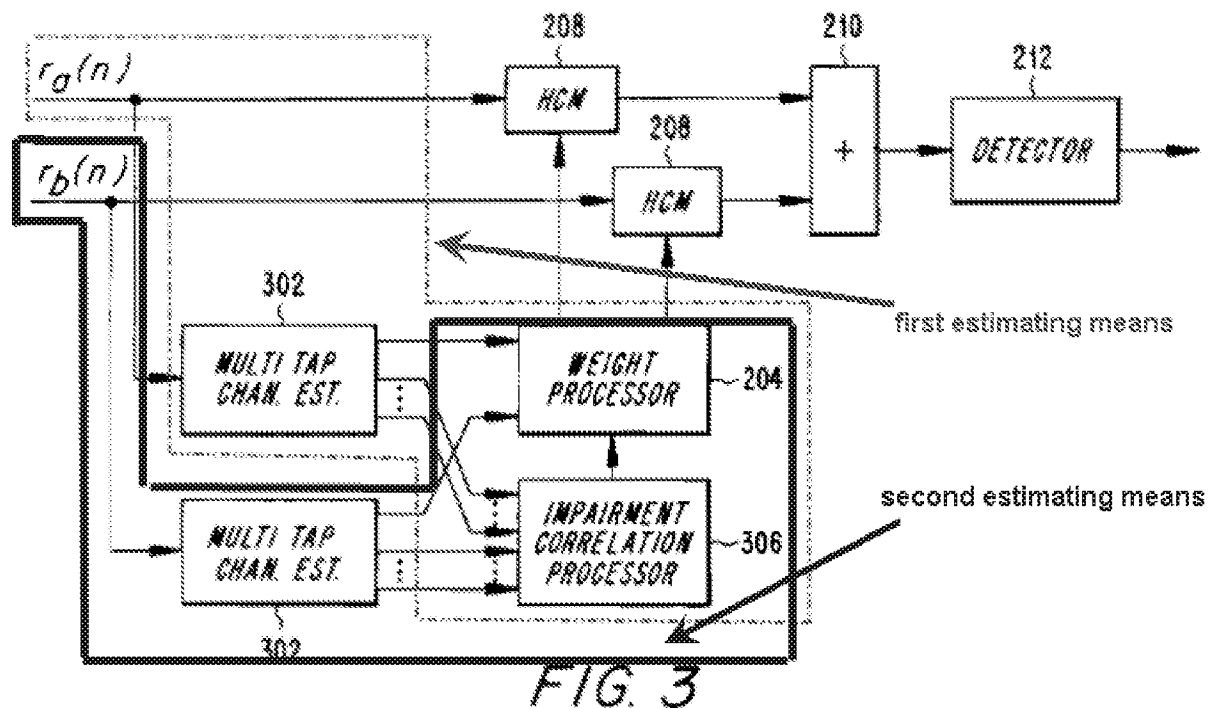
The Bottomley patent discloses a method and apparatus for mitigation of self interference using array processing, which includes multiple antenna receiving branches, and each branch having estimating means.

8. However, Applicant refers to rejection of claim 1 limitations and contends (emphasis added):

Applicant submits that the Examiner is mistaken. Applicant notes that Bottomley clearly shows separate channel estimators 302 for each of the branches $r_a(n)$ and $r_b(n)$. While Bottomley shows the outputs from these two channel estimators being co-processed in an impairment correlation processor 306 and a weight processor 204 for providing weights for respective half complex multipliers (HCM) 208, the two channel estimators operate independently from each other. Hence, Applicant submits that there is no disclosure or suggestion of the estimating means in the further branch using at least a part of the channel parameter estimate in the one branch as an aid for estimating at least a receiving channel parameter in the further branch.

In view of the above, Applicant believes that the subject invention, as claimed, is neither anticipated nor rendered obvious by the prior art, and as such, is patentable thereover.

9. Examiner respectfully disagrees. Applicant fails to notice that his claimed "a first estimating means" is equivalent to three components of Fig. 3, i.e., 204, 306 and 302, which are connected to $r_a(n)$; and his claimed "a second estimating means" is equivalent to three components of Fig. 3, i.e., 204, 306 and 302, which are connected to $r_b(n)$, as shown below (emphasis added):



A block diagram of an exemplary embodiment of the present invention is given in FIG. 3. Each antenna's received sample stream is provided to a multi-tap channel estimator 302, which models the channel using a plurality of channel taps. One channel tap estimate from each antenna is provided to the weight processor 204. The rest of the channel tap estimates are provided to the impairment correlation processor 306, which computes an impairment correlation matrix using the channel tap estimates. Then, as in FIG. 2, the weight processor 204, the HCMs 208, the summer 210, and the detector 212 are used to form a detected information symbol stream.

Therefore, as noted and admitted by the Applicant discussed above, the first and second estimating means have 204 in common (i.e., “operatively connected”), which 204 receives one channel tap from each antenna, as underlined in the extract above

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(i.e., "using at least a part of the channel estimation in the one branch as an aid for ... in the further branch").

10. Therefore claim 1 stands rejected.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

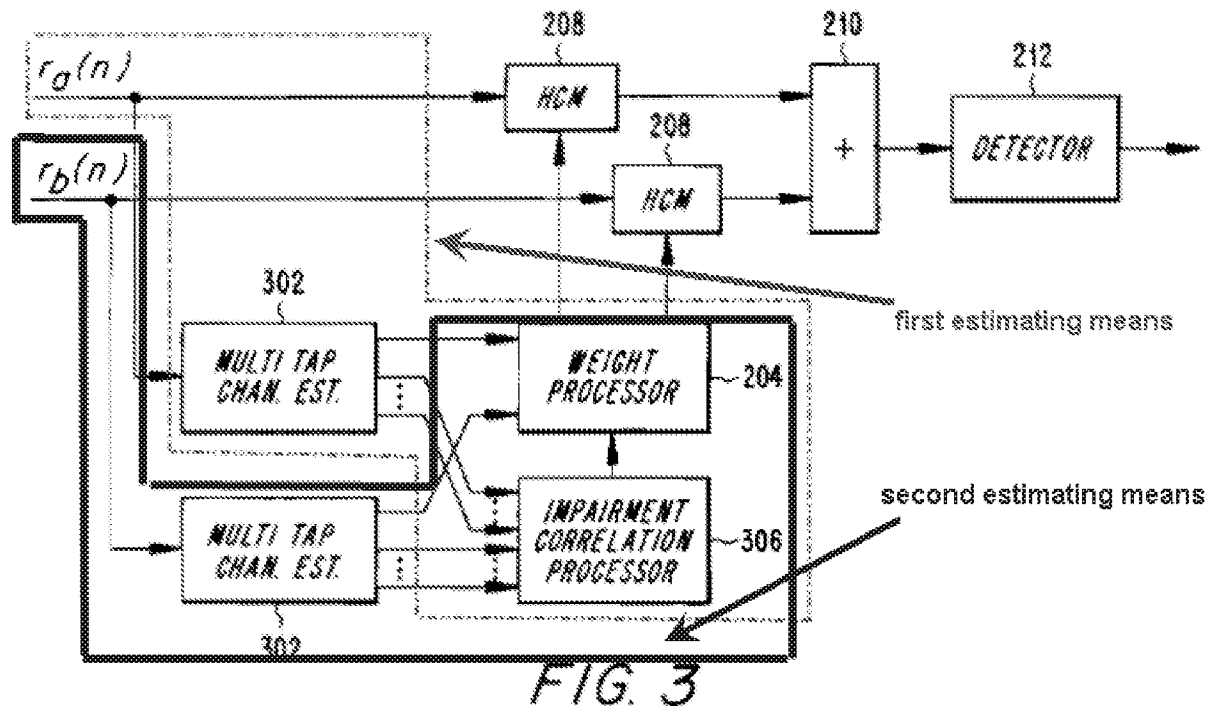
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1-8 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Bottomley (US 5787131 A).

Regarding claim 1, Bottomley discloses a diversity receiver (Fig. 3; col. 4: lines 48-59) comprising multiple antenna receiving branches ($r_a(n)$ and $r_b(n)$ in Fig. 1 and Fig. 3), each of said multiple antenna receiving branches comprising estimating means for estimating at least a receiving channel parameter, wherein a first estimating means (204, 306 and 302 connected to $r_a(n)$ in Fig. 3) in one branch of the multiple antenna receiving branches ($r_a(n)$ in Fig. 3) is operatively connected to a second estimating means (204, 306 and 302 connected to $r_b(n)$ in Fig. 3) in a further branch of the multiple antenna receiving branches ($r_b(n)$ in Fig. 3) for using at least a part of the channel

parameter estimate in the one branch as an aid for estimating at least a receiving channel parameter in the further branch (302 from estimating means of $r_a(n)$ branch is connected to 204 from channel estimating means of $r_b(n)$ in Fig. 3 ; furthermore, 302 from estimating means of $r_b(n)$ branch is connected to 204 from channel estimating means of $r_a(n)$ in Fig. 3; 204 as described in col. 4 – emphasis added:)

A block diagram of an exemplary embodiment of the present invention is given in FIG. 3. Each antenna's received sample stream is provided to a multi-tap channel estimator 302, which models the channel using a plurality of channel taps. One channel tap estimate from each antenna is provided to the weight processor 204. The rest of the channel tap estimates are provided to the impairment correlation processor 306, which computes an impairment correlation matrix using the channel tap estimates. Then, as in FIG. 2, the weight processor 204, the HCMs 208, the summer 210, and the detector 212 are used to form a detected information symbol stream.



Therefore, as noted and admitted by the Applicant discussed above, the first and second estimating means have 204 in common (i.e., "operatively connected"), which 204 receives one channel tap from each antenna, as underlined in the extract above (i.e., "using at least a part of the channel estimation in the one branch as an aid for ... in the further branch").

Regarding claim 2, Bottomley discloses as stated in rejection of claim 1 above. He also discloses the channel parameter estimate in the one branch is used as a starting point for the channel parameter estimate in the further branch (302 from estimating means of $r_a(n)$ branch is connected to 306 from channel estimating means of $r_b(n)$ in Fig. 3 ; furthermore, 302 from estimating means of $r_b(n)$ branch is connected to 306 from channel estimating means of $r_a(n)$ in Fig. 3).

Regarding claim 3, Bottomley discloses as stated in rejection of claim 1 above. He also discloses the channel parameter estimate in the one branch provides a coarse channel parameter estimate (output of 302 from estimation means of $r_a(n)$ branch), and wherein said coarse channel parameter estimate is used as a start for the channel parameter estimate in the further branch (output of 302 from estimation means of $r_a(n)$ branch is input to estimation means of $r_b(n)$ through 204 and 306 in Fig. 3).

Regarding claim 4, Bottomley discloses as stated in rejection of claim 1 above. He also discloses the second estimating means in the further branch is operatively connected to the first estimating means in said one branch for using at least a part of the channel parameter estimate in the further branch as an aid for estimating the receiving parameter channel in said one branch (302 from estimating means of $r_a(n)$ branch is connected to 306 from channel estimating means of $r_b(n)$ in Fig. 3 ; furthermore, 302 from estimating means of $r_b(n)$ branch is connected to 306 from channel estimating means of $r_a(n)$ in Fig. 3).

Regarding claim 5, Bottomley discloses as stated in rejection of claim 1 above. He also discloses the diversity receiver has two antenna receiving branches ($r_a(n)$ and $r_b(n)$ in Fig. 1 and Fig. 3).

Regarding claim 6, Bottomley discloses as stated in rejection of claim 1 above. He also discloses the diversity receiver is arranged for estimating a time delay between the appearance of a certain channel parameter estimate in the various branches ("delay spread" in col. 1: lines 40-55; "path delay" in col. 4: lines 35-47).

Regarding claim 7, Bottomley discloses as stated in rejection of claim 1 above. He also discloses a mobile radio communication device provided with the diversity receiver ("a digital wireless communication system" in col. 6: lines 38-64)

Regarding claim 8, Bottomley discloses a method for receiving a signal (Fig. 1; Fig. 3; col. 4: lines 48-59) comprising the acts of: receiving the signal through multiple antenna receiving branches ($r_a(n)$ and $r_b(n)$ in Fig. 1 and Fig. 3); in each branch, estimating, using estimating means (one estimating means includes 204, 306 and 302, which are connected to $r_a(n)$, and other estimating means includes 204, 306 and 302, which are connected to $r_b(n)$ in Fig. 3) parameters about a received channel to form channel estimation results(output estimating means of $r_a(n)$ branch in Fig. 3, which is input of 208 connected to $r_a(n)$; also output estimating means of $r_b(n)$ branch in Fig. 3, which is input of 208 connected to $r_b(n)$); directly exchanging the channel estimation results between a first branch (channel estimation means of $r_a(n)$ branch, which includes 204, 306 and 302 connected to $r_a(n)$ in Fig. 3) of the multiple antenna receiving branches($r_a(n)$ and $r_b(n)$ in Fig. 1 and Fig. 3) and a second branch (channel estimation means of $r_b(n)$ branch, which includes 204, 306 and 302 connected to $r_b(n)$ in Fig. 3)of

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the multiple antenna receiving branches ($r_a(n)$ and $r_b(n)$ in Fig. 1 and Fig. 3); and using first channel estimation results about a first received channel from the first branch in the estimating means in the second branch as an aid for estimating parameters about a second received channel in the second branch and forming second channel estimation results (302 from estimating means of $r_a(n)$ branch is connected to 306 from channel estimating means of $r_b(n)$ in Fig. 3 ; furthermore, 302 from estimating means of $r_b(n)$ branch is connected to 306 from channel estimating means of $r_a(n)$ in Fig. 3).

Regarding claim 10, Bottomley discloses as stated in rejection of claim 8 above. He also discloses estimating a delay value between a first channel parameter in the first branch and the first channel parameter in the second branch ("delay spread" in col. 1: lines 40-55; "path delay" in col. 4: lines 35-47); and synchronizing estimation in the branches by using the delay value (Examiner notes that the impairment estimator in Fig. 2 can be replaced by a data correlation estimator, which estimate the data correlation matrix R_{rr} as recited in col. 3: lines 15-34. However, with 2 antennas and 3 channel taps, the aforesaid matrix is nonsingular, and an inverse can be computed as recited in col4: lines 35-47, which is interpreted as estimation using the two rays are synchronized)

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

15. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nader Bolourchi whose telephone number is (571) 272-8064. The examiner can normally be reached on M-F 8:30 to 4:30.

17. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David. C. Payne can be reached on (571) 272-3024. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

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18. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).

/Nader Bolourchi/
Examiner, Art Unit 2611

/Mohammad H Ghayour/
Supervisory Patent Examiner, Art Unit 2611